NATIONAL PARK SERVICE
CHANNEL ISLANDS NATIONAL PARK

Technical Report CHIS-92-02

MARINE DEBRIS MONITORING PROGRAM
1991 ANNUAL REPORT

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ABSTRACT

Results are presented from three quarterly surveys conducted during year 3 (1990-1991) at six study beaches on Santa Rosa and San Miguel Islands within Channel Islands National Park (CHIS). A total of 17,214 items was recorded, 94% consisting of plastic. Foam fragments dominated the counts, comprising 55% of the total. Most of the foam fragments came from Sandy Point Beach on Santa Rosa Island. The winter survey from Sandy Point accounted for 60% of all of the foam. Different beaches varied in types and amounts of debris, but were consistent with themselves. Debris categories were consistent seasonally in 1991; however, seasonal patterns were different from previous years. Total debris was most numerous in the winter survey only because of foam fragments. The 10 most abundant plastics in rank order were foam fragments, hard fragments, bottles $\leq$ 1 gallon, caps and lids, drinking straws, bags < 1 m^2, rope < 1 m long, balloons, plastic sheets < 1 m^2, and toys. Glass bottles were the most abundant non-plastic debris, ranking eighth overall. Ingestible debris items were dominated by foam fragments at a mean of 547/km. Rope was the most common entangling debris item at a mean of 7.2/km. A total of seven nets were found on 17 transects. Most of the debris probably originates from litter from fishing boats. Shipping and mainland sources probably contribute as well.

INTRODUCTION

Marine debris has become an issue of national concern in recent years. Plastic debris is of greatest concern because of its persistence in the environment and the hazards it poses to wildlife that may ingest it or become entangled in it. Marine debris also presents health and safety hazards and diminishes the aesthetic value of our beaches.

In order to establish a scientific data base about the abundance, composition, and accumulation rates of human-generated marine debris found on continental United States beaches, the National Park Marine Debris Monitoring Program was initiated in 1989. This five-year research effort, jointly funded by the National Park Service (NPS) and the National Marine Fishery Service (NMFS), is monitoring the marine debris accumulation in eight National Parks located along the Pacific, Gulf, and Atlantic Coasts. Cole et al. (1990) and Manski et al. (1991), describe the results from the first two years of this national program.

Channel Islands National Park (CHIS) is one of the parks in this program. Richards and Dugan (1991) and Richards (1991) describes the results from CHIS during the first two years of monitoring. This report summarizes the results from year 3 of monitoring marine debris at CHIS.

STUDY AREA

Channel Islands National Park consists of five islands and surrounding marine ecosystems off the southern California coast. The park boundary includes five of the eight California Channel Islands and the submerged lands and water within 1.8 km (1 nm) of each island. The islands range in size from 260 ha Santa Barbara Island to 25,100 ha Santa Cruz. The total area of the park (100,000 ha) is divided nearly equally between submerged lands and islands. The park is a Man in the Biosphere Reserve, and overlaps the Channel Islands National Marine Sanctuary. The islands harbor the only remaining pristine coastline in southern California and are recognized for the rich abundance of wildlife that concentrates around the islands to breed.

Santa Barbara and Anacapa Islands are small volcanic islands with few sandy beaches. Santa Cruz Island has long stretches of sandy beach, but is currently under private ownership. The two islands in this study, Santa Rosa (21,450 ha) and San Miguel (4,047 ha) have a mix of sandy beaches and rocky shoreline. Santa Rosa and San Miguel Islands are the two most western islands in the chain.

Prevailing winds throughout most of the year are from the northwest, hitting San Miguel and the west end of Santa Rosa Islands with full force from the open sea. Major storms often bring large southerly swells which impact the south facing beaches. Northeasterly "Santa Ana" winds occasionally occur in the fall and winter, generally creating calm conditions at Santa Rosa and San Miguel Islands.

The Santa Barbara Channel which separates the islands from the mainland coast is a major shipping route for vessels to and from the ports of San Pedro, Long Beach, and Los Angeles. The south bound shipping lane comes within a few km of the northern islands.
The Santa Maria Basin which lies just north of Point Conception and the Santa Barbara Channel have extensive oil and gas development. Offshore oil rigs are present throughout the channel and basin. Several storage and refinery facilities are located in the area and are regularly serviced by tankers.

Substantial recreational and commercial fishing fleets operate out of Ventura and Santa Barbara harbors, primarily working within the park boundary. Various trawlers, gillnetters, and purse seine boats ply the channel and island waters for rockfish, shark, squid, halibut, and other ground fish. Commercial divers collect sea urchins and abalone near shore around the islands. As many as 65 fishing vessels have been observed around the west end of Santa Rosa Island on one day (Pers. obs., Dec. 1991).

There is extensive military activity in the area originating from the two Navy bases in Oxnard and Port Hueneme, and the facilities on San Clemente and San Nicholas Islands. Within the park boundary, a small Navy facility exists on Santa Cruz Island and air operations are conducted around Santa Rosa and San Miguel Islands.

STUDY BEACHES

Marine debris was monitored at five 1-km and one 600-m beaches (Figure 1). Public use of all six beaches was very low. Visitation to these beaches was primarily by NPS island personnel. Though chosen to avoid disturbing as little wildlife as possible, all of the beaches are important to wildlife. Each of the beaches are utilized at times by foraging shorebirds and resting harbor seals and elephant seals. Snowy plovers use the beaches for nesting in the spring and summer.

1. Simonton Cove: This beach faces directly into the prevailing northwest wind, with no protection from any points of land. The long, wide beach is backed by low dunes and a steep bluff. Average width of the beach was approximately 40 m. The flat beach consists of fine sand.

2. Cuyler Harbor: This sandy beach faces north and is somewhat protected by the island to the west. High dunes back the beach at both ends and a rocky cliff with a small jutting reef break up the beach in the middle. Most of the beach is less than 20 m wide. Cuyler Harbor is the primary anchorage on San Miguel Island with an average of two to three boats (maximum, approximately 20-30) anchoring there at night during most months. This is the only beach with much public access; however, visitation is still low.

3. Sandy Point: This beach faces northwest, though the winds may be tempered somewhat by Point Conception, approximately 60 km to the north. This beach undergoes severe erosion at times leaving several small rocky points along the 1 km transect. The width varies from 10 to 40 m at low tide. Large amounts of kelp wrack often pile up on the beach after storms. The narrow beach is backed by a low cliff.

4. Arlington Canyon: This flat, sandy beach is 600 m long with a northern exposure. The beach is backed by dunes and a small lagoon fed by a perennial stream near the west end of the beach. Except at the lagoon where it is generally wider, the width is only about 10 m. Kelp wrack occasionally piles up very deep along the waters edge after storms.

5. Cluster Point: The only survey beach on the south side of the island, this beach faces southwest. The sand beach is generally flat and fairly broad (20-30 m wide). Low vegetated dunes back the western half of the beach forming a narrow toe along cliffs. The eastern half of the beach is backed by a low dune field and forms a small hook at the rocky point on the eastern margin.

6. Skunk Point: The east end of the survey transect is nearly 50 m wide as the point curves around to the south. The sand beach is very flat and often overwashed by high tides. Occasionally a shallow lagoon forms behind the berm. Low dunes behind the beach gradually climb a tall bluff. The northern exposure faces Beechers Bay which is a popular anchorage and is the main access to the island and ranch operation.

METHODS

Beaches were surveyed in November/December 1990, April and September 1991. Intense storms throughout the month of March delayed the winter surveys into April. Rain from the March storms caused erosion on the roads, preventing us from surveying Cluster Point on those surveys. Spring surveys (June) were not conducted to avoid disturbing nesting snowy plovers.

Three to eight people conducted the surveys. The survey area for each beach included the intertidal zone between the water's edge and the seaward limit of terrestrial vegetation or base of the foredune or cliff. All human-generated debris visible from a walking height was collected and recorded on data sheets (see Manski et al. 1991 for debris definitions). Debris was generally sorted and tallied off-site. All debris was either removed or marked and noted so not to be counted on future surveys. Tar on the beach was noted as present or absent.

Items less than one-half their original size were considered fragments. Netting with less than five complete meshes were also regarded as fragments. Plastic cones from hagfish traps were reported as fishing gear fragments, but were noted as a special category also. Items attached as a functional unit were not counted separately (e.g., a rope connected to a float was classified as a float). Items were classified to their use (e.g., plastic bottles with a line attached were classified as other floats).

Plastic items considered as wildlife entanglement hazards included: rope $\geq$1 m, trawl web, gillnets, closed straps, fishing line, six-pack yokes, rope loops, and gaskets, rings, and bands. Plastic debris regarded as harmful to wildlife if ingested included bags, foam fragments, balloons, sheeting and pellets. Measurements and other information on ropes, netting, and floats were recorded (see Manski et al. 1991 for data sheets).

Arlington Canyon beach is only 600 m long. This beach was included in the surveys because it was the most accessible beach with this exposure. All values reported were extrapolated to 1 km.

Subsampling was performed on the winter (April) survey of Sandy Point for foam fragments. Foam fragments were collected from three randomly chosen 100 m transects at 300, 600, and 900 m along the survey beach. The reported value was extrapolated to 1 km. All other debris was collected along

the entire transect.

During the winter survey, one typical beach from each park was to be chosen for a second, more intense survey immediately following the first. Arlington Canyon was chosen as a typical beach (for the amount of debris present), and resampled in April. After collecting debris while walking one direction, we collected debris found walking back along the beach and looking very closely. The debris from the walk back was added to the total reported but noted separately for comparison.

Quarterly data from the debris surveys were entered into a computerized data base for analysis and graphics production by Dr. Andrew Cole at Nova University.

RESULTS

A total of 17,214 items was recorded during 17 beach surveys in year 3 (five beaches were sampled in three quarters and one was sampled in two - see above). The total quantities of debris by season are presented in Table 1. Plastic constituted 94% of the total debris (Figure 2). Glass (mostly bottles), metal (mostly cans) and paper made up the non-plastic portion of the samples. Wood was only counted in the December surveys this year and will not be considered in analysis. Glass bottles/jars was the eighth most abundant category overall. On all six beaches, plastics made up over 80% of the total debris. Miscellaneous debris was the most common plastic category (67%), followed by packaging (22%), fishing (7%) and personal (4%). The ranking these four categories did not change seasonally (Figure 3). The miscellaneous category was dominated by foam and hard plastic fragments which were the two most abundant plastic items.

Collectively, the 10 most abundant plastic items (Figure 4) accounted for 85% of all the debris found. Foam and hard plastic fragments comprised 71% of the top ten items. Foam fragments (9,298 pieces) averaged 547 per km, accounting for 55% of the total debris items. The Sandy Point winter survey alone accounted for 5,670 pieces of foam. Hard plastic fragments, small bottles, caps and lids, straws, small bags, rope fragments, balloons, small plastic sheets, and toys round out the top ten most abundant plastic items for year 3. Rope > 1 m, smoking accessories, and other floats are items that made it into the top ten seasonally (Figure 5).

Ingestible debris was dominated by foam fragments (Table 2). Small plastic bags, balloons, and small plastic sheets were other ingestible items that were abundant. The winter survey had the most ingestible debris, dominated by the large amounts of foam fragments. Balloons and plastic bags were most abundant in the fall surveys, while plastic sheets were most abundant in the summer surveys. Sixty-eight percent of the small plastic bags came from the fall survey.

Entangling debris (Table 3) was present at a mean of 12.7 items per km. Rope was the most common item at 7.2 per km. Cluster Point had the most rope by length. Entangling items were most common in the fall surveys. No entangled wildlife was observed during any of the surveys.

Only 10 plastic and three glass medical debris items were found accounting for much less than 1 percent of the total debris. Two diabetic type syringes were found. Other items in this category were prescription pill bottles and eye drops, and nasal spray. Glass vials accounted for the non-plastic medical debris.

During the winter survey, Arlington Canyon was subjected to a second more intense survey, where we traversed the beach more frequently. An additional 67 items in 15 categories were collected. Those 67 items accounted for 13.5% of the 493 total items from the beach. Forty-two of those items were foam and hard fragments. Others included straws, caps/lids, rope fragments, and toys.

Unusual debris items included two bottles with notes in them, full cans of beer, a bottle of whiskey, refrigerators, freezers, washing machine parts, full cartons of milk, a windshield wiper, milk cartons produced in Japan, Hawaii, Mexico, and a 5-gallon container full of oil. Several cans with US Navy markings were found off the transects on San Miguel Island that contained gas masks.

Identifiable items included the notes in bottles, a Princess Cruise Line shampoo bottle, and a balloon from Realty World in Port Hueneme. Many items, including plastic bags, plastic and glass bottles, light bulbs, cans, and milk or juice containers had writing indicating origins from Japan, Korea, Mexico, Malaysia, northern Europe (Norway?), or other Asian countries. Only two items were attributed to the offshore oil industry. The specific items were not noted, but the typical find is a hardhat or life preserver with logo or rig name.

BEACH NOTES

Simonton Cove: This beach had the highest diversity of debris. Foam and hard plastic fragments, plastic bottles, caps and lids, and plastic bags were some of the more numerous items found. Balloons (62) and hagfish trap cones (26) were most numerous here. Many items with foreign writing were found on this beach.

Cuyler Harbor: The highest percentage of non-plastic debris was found here, but still only comprised less than 20% of the total. This beach was typically the cleanest with foam and hard fragments, quart oil containers, and galley waste (food containers, plastic and glass bottles) being the most numerous items. Boat parts (seat cushions, pumps) were often found.

Sandy Point: Large amounts of foam were found on every sample. Sandy Point accounted for 76% of all the foam fragments recorded in year 3. Large items (LP tanks, tire, life vests, lobster traps) occasionally wash up on this beach.

Arlington Canyon: This beach often receives large quantities of natural debris such as kelp wrack, lobster molts, shark egg cases, and snail shells. There typically seems to be a disproportionately large amount of metal debris in all forms on this beach.

Cluster Point: Most of the debris on this beach accumulated at the east end, where the beach makes a small hook at a rocky point and catches the westerly winds. Lobster traps, and dive gear including commercial urchin baskets were some of the notable items indicating fishing boats were responsible for most of the debris on this side of the island.

Skunk Point: Every sample on this beach turned up a disproportionate number of straws. Approximately 62 percent of the total number of straws came from Skunk Point. Hard plastic fragments, glass bottles/jars, and wood pieces were also abundant on this beach. Four of the seven nets found this year were on Skunk Point.

Table 1. Total quantities of marine debris by season at Channel Islands National Park in Year 3. Totals are from all six beaches. Values from Arlington Canyon were extrapolated to 1 km, and the winter foam fragments total contains extrapolated values (see text).

DEBRIS ITEM	FALL	WINTER	SUMMER	TOTAL NUMBER OF DEBRIS ITEMS FOUND
FISHING GEAR				
TOTAL	398	298	465	1161
Trawl Net	2	0	1	3
Monofilament Gillnet	1	0	1	2
Multifilament Gillnet	0	1	1	2
Rope >=1m	56	25	41	122
Rope < 1m	143	59	164	366
Mono Fishing Line	2	0	1	3
Rope Loops	7	4	3	14
Open Straps	34	10	10	54
Closed Straps	6	6	0	12
Trawl Float	1	12	1	14
Gillnet Float	5	22	13	40
Crustacean Float	13	21	52	86
Buoy Bag	2	3	2	7
Other Float	19	25	68	112
Quart Oil Cont.	27	38	46	111
5 Gallon Oil Cont.	3	2	5	10
Fish Basket	3	0	0	3
Bait Containers	16	13	21	50
Lures	7	1	5	13
Chemical Ampules	0	0	0	0
Light Stick	6	4	5	15
Fragments	31	42	19	92
Miscellaneous	14	10	6	30
PERSONAL EFFECTS (PLASTIC)				
TOTAL	250	247	225	722
Hats/Helmets	8	3	4	15
Footwear	15	23	29	67
Gloves	2	0	4	6
Smoking Accessory	48	53	39	140
Toys	48	78	42	168
Balloons	84	48	61	193
Comb/Brush/Eyeglass	17	8	17	42
Tampon Applicators	5	8	6	19

Miscellaneous	23	26	23	72

Table 1. (Continued)

DEBRIS ITEM	FALL	WINTER	SUMMER	TOTAL NUMBER OF DEBRIS ITEMS FOUND
PLASTIC PACKAGING				
TOTAL	1546	982	955	3483
Bottles <= 1 Gal.	328	377	382	1087
Caps/Lids	408	240	227	875
Bags < 1m	306	58	89	453
Bags >= 1m	4	0	0	4
Cups	5	13	8	26
Styrofoam Cups	18	8	3	29
Styrofoam Food Container	5	2	8	15
Container/Bowl/Utensil	39	27	37	103
Drinking Straws	408	214	171	793
Pails/Buckets	3	7	1	11
Six-Pack Yokes	11	6	7	24
Beverage Crates	2	0	0	2
Bulk Liquid Container	3	7	7	17
Styrofoam Packaging	1	5	7	13
Miscellaneous	5	18	8	31
MISCELLANEOUS PLASTICS				
TOTAL	2177	6844	1831	10852
Sheet < 1m	50	38	99	187
Sheet >= 1m	0	2	3	5
Shotgun Wads	18	8	12	38
Pipe/Tubing	10	32	16	58
Brushes/Brooms	5	2	12	19
Garbage Cans	1	0	0	1
Tires/Innertubes	2	1	2	5
Hard Fragments	329	389	436	1154
Foam Fragments	1721	6344	1233	9298
Pellets	0	0	0	0
Gaskets/Rings	12	15	10	37
Miscellaneous	21	7	8	36
Medical	7	5	0	12
Oil Industry	1	1	0	2

Table 1. (Continued)

DEBRIS ITEM	FALL	WINTER	SUMMER	TOTAL NUMBER OF DEBRIS ITEMS FOUND
NON PLASTICS				
TOTAL	333	289	374	996
Glass Bottles	124	95	110	329
Light Bulbs	23	39	35	97
Medical (glass)	1	0	2	3
Glass Pieces	4	9	30	43
Misc. (glass)	0	1	0	1
Stone	0	0	0	0
Paper	44	48	60	152
Bottle Caps	0	0	0	0
Propane Canisters	10	4	1	15
55-Gallon Drums	0	1	0	1
Beverage Cans	36	14	49	99
Other Cans	31	39	32	102
Wire/Cable	7	0	3	10
Crab/Fish Traps	2	5	4	11
Metal Pieces	33	28	35	96
Misc. (metal)	10	6	2	18
Cloth	7	0	11	18
Leather	1	0	0	1
	4704	8660	3850	17214

Table 2. Types and quantities of ingestible plastic items per km at Channel Islands National Park, Year 3. Six 1-km beaches were sampled in Fall 1990, winter and summer 1991.

Debris item	Mean #/km (std. err.)	Min-Max
Foam fragments	547.1 (326.3)	8-5670
Bags < 1 m^2	26.6 (8.3)	1-117
Balloons	11.3 (1.9)	1-25
Plastic sheet < 1 m^2	11.0 (2.9)	0-43
Plastic sheet ≥ 1 m^2	0.3 (0.1)	0-1
Bags ≥ 1 m^2	0.2 (0.1)	0-2
Pellets	0	

Table 3. Types and quantities of entangling plastic debris per km at Channel Islands National Park, Year 3. Six 1-km beaches were sampled in Fall 1990, winter and summer 1991.

Debris Item	Mean #/km (Std. Err.)	Min-Max
Rope ≥ 1 m	7.2 (1.4)	0-19
Gaskets/rings	2.1 (0.5)	0-9
Six-pack yokes	1.4 (0.6)	0-8
Rope loops	0.8 (0.3)	0-4
Closed straps	0.7 (0.4)	0-5
Mono. fishing line	0.2 (0.1)	0-1
Trawl net	0.2 (0.1)	0-1
Mono. gill net	0.1 (0.1)	0-1

Multi. gill net	0.1	(0.1)	0-1

DISCUSSION

The total amount of debris collected in year 3 was about 5% less than year 2 (Richards 1991). Cluster Point was not surveyed in April; however, this is one of the cleaner beaches and would not likely have added more than a couple hundred items to the total of over 17,000.

Styrofoam continued to make up the largest portion of the total debris found. The total number dropped slightly, from a mean of 575/km in year 2 to 547/km in year 3. Foam fragments were approximately ten times more abundant than the next most abundant item. Individual pieces in this category ranged from pieces of styrofoam approximately 1 cm, to pieces of seat cushions approaching 1 m. Broken styrofoam cups or food trays probably contributed the majority of small foam pieces. Other sources include styrofoam packaging that had broken up and styrofoam packing "peanuts". Since most of the foam fragments come from packaging material, the broad packaging category should be the largest category and the miscellaneous category would become only a small percentage of the total.

Foam fragments were consistently one the most abundant items on Simonton Cove, Sandy Point, and Arlington Canyon beaches, and were occasionally found in abundance on other beaches. The winter survey from Sandy Point alone accounted for 60% of all the foam fragments and 33% of all the debris for the year. Possible reasons for the disproportionate amount of foam on this narrow beach may be that it is exposed directly into the prevailing winds, is backed by steep bluff, and that this end of the island receives a large amount of boat traffic (ie. more styrofoam cups, etc.). Foam on this beach may be reworked by the waves, but is less likely to blow away than on some other beaches.

Hard plastic fragments often originate from broken plastic bottles that degrade in the sun and fracture. Hard plastic fragments represented a broad spectrum of plastic items, of which, only pieces could be found. Approximately 7% of the total debris pieces were hard fragments, a decrease from 10% in year 2.

The first six items on the ten most abundant list have been on the list for all three years of monitoring. Only two changes occurred between years 2 and 3; food containers and quart oil containers dropped out and plastic sheets and toys moved up the list. Toys and food containers were on the list in year 1. Quantities of debris per km changed very little between years 2 and 3. The largest change was the decrease in the number of hard fragments from 104/km in year 2 to 68/km in year 3.

Instead of being most abundant in the winter, as it was last year, rope was least abundant in the winter surveys this year. This may be a result of the difference in storm patterns. Before the winter surveys in 1991, the biggest storms of the year hit the islands with considerable rain, high winds, and big surf. The storms could have removed or buried some of the rope and other debris causing the reduced quantities in the winter survey. The increase in rope abundance in fall and summer is harder to explain, though sand burial/erosion is a possible explanation. The abundance of rope pieces increased from 6.2/km to 7.2/km over the last year. Over 900 m of rope was found during compared to 677 m last year.

The rankings of entangling debris did not change from last year. Slightly more rope and six-pack yokes were found. Rope loops and closed straps nearly doubled, though the numbers are still low. Monofilament fishing line and gaskets decreased.

The rankings of ingestible debris also did not change from last year. Foam fragments top the list, and changed little in abundance. The number of balloons decreased slightly, though small bags and sheets increased considerably.

The 34 hagfish trap pieces found this year represent a decline from the 89 pieces and two complete traps found in year 2. The trap pieces were generally just the black plastic cone used at the mouth of the trap. Five-gallon buckets are used as traps and occasionally the entire lid with the cone entrance was found. This fishery is completely market driven with the hagfish being exported to South Korea for eelskin leather production. The hagfish fishery in southern California ended after only one year of explosive growth in 1990.

The second survey of Arlington Canyon in April was not really an accurate comparison of the usual effort with the more intense method because we would normally walk back down the beach collecting whatever debris we came across the second time. Most of the items found during the second survey were small fragments.

Wood was not counted in year three following the decision made at the coordinators meeting, March, 1991. The slight increase in the plastic percentage of the total (from 92% in year 2 to 94% in year 3) probably results from not counting wood. Simonton Cove, Sandy Point, Cluster Point, and Skunk Point all had considerable amounts of wood at on at least one survey, but there was no seasonal pattern noticed.

OPERATIONAL SUPPORT

Volunteers contributed approximately 44 percent of the total time required to complete debris surveys at CHIS during year 3 of this study. Volunteers included CHIS staff on their own time, biologists from the California Department of Fish and Game, and others. CHIS staff represented many divisions including protection, interpretation, boat operations, research, and resource management.

Approximately 472 hours of staff time and 370 hours of volunteer time was involved in the debris surveys. Over 40 hours was spent in report preparation and data management through the year. Salary costs were approximately $5,300.

Funding from WASO was used to offsett salaries and overtime and for support costs amounting to approximately $4,223. Support costs included three flights to San Miguel Island ($2400), boat travel to Santa Rosa Island ($1200), vehicle costs for island travel on Santa Rosa Island ($57), island per diem ($366), and data processing ($200).

Marine debris surveys were combined with rocky intertidal monitoring surveys at Santa Rosa Island in December and at San Miguel Island in April. This saved money for transportation and made the most efficient use of time.

This year several evening and offsite programs about marine debris were given to the general public. Special demonstrations were given and literature about the problem was passed out at the Earth Day 1991 celebration at the park. Debris collected from island beaches was used for displays in the visitor center. A marine debris totem pole was created by a local artist for the visitor center with a message about trash. The park participated in the 1991 Coastal Cleanup along the local mainland beaches. Local kayakers spent several days collecting debris along beaches around Anacapa Island during October 1991, in a cooperative project with the park.

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FIGURES